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ABSTRACT

Industrial arts is a program of instructional and laboratory experiences that provides basic general education for all students. Industrial arts curricula consist of experiences based upon nationally relevant economic and industrial clusters, and industrial arts courses provide "hands-on" manipulative experiences that serve students' occupational and vocational needs in a manner that is consistent with the demands of our technological society. In 1972, Congress recognized the importance of industrial arts by extending the benefits that go to vocational education and, thereby, to industrial arts as well. Because industrial arts education promotes vocational and technological exploration, it can serve as an important contributor in helping vocational educators achieve goals more effectively and efficiently. Despite the potentially great benefits to be derived from a close partnership between industrial arts and vocational education, many problem areas still need to be solved pertaining to the coordination of industrial arts and vocational education. Included among these problem areas are the widespread practice of funding industrial arts programs only after vocational education programs have been funded and the existence of significant tensions between the industrial arts and vocational education sectors in some states. (MN)

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INDUSTRIAL ARTS WORKS WITH VOCATIONAL EDUCATION

A Statement on the Purposes and Roles of Industrial Arts In Relation to Vocational Education and on the Potential in Increased Cooperative Work

By

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for

The National Association of
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Anaheim, California
December 4, 1983

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Because of its potential impact, the efforts of many dedicated professionals were invested in this document. It is important to acknowledge such work both for the thanks that these true professionals deserve as well as for the increased validity that is afforded a document with profession-spanning input such as that advanced by leaders from each association, including Kendall Starkweather, William Dugger, James E. Good, Ralph V. Steeb, Samuel Powell, and Harold Berryhill. For the commitment of these leaders, and the many others cited in support of key points, the industrial arts profession must be truly grateful. Through their vision, our nation's response to the demands of technology and contemporary work life, as mediated by industrial arts, will be shaped. We are indeed fortunate for their contributions on our behalf.

Appreciatively,

Michael J. Dyrenfurth
November 24, 1983

INDUSTRIAL ARTS TODAY: A DYNAMIC SUBJECT WITH SIGNIFICANT RELEVANCE TO BOTH TECHNOLOGY AND VOCATIONAL EDUCATION!

INTRODUCTION

Purpose

- To illustrate how vocational education and industrial arts have worked together effectively.
- To clarify what industrial arts is.
- To point out where vocational education and industrial arts can work together with great potential.
- To candidly bring to your first-hand attention some areas where the interface between vocational education and industrial arts is causing one or both of us problems.
- To learn from your perspectives how our profession can better execute its responsibilities.

Intent

- My intent is to be positive and up-beat but candid to the point where it might be considered very direct.
- Foster two-way communication
- Improve the profession and thereby serve youth more effectively and efficiently with scarce resources.

Context

In the Education Amendments of 1976, Congress recognized the significant contribution of industrial arts to vocational education by specifically naming industrial arts as an area eligible for federal funding. The law (PL 94-482) identified industrial arts in two of its sections:

> Section 120 (G) (1) (I); Authorization of Grants and Uses of Funds: "Industrial Arts Programs where such programs will assist in meeting the purpose of this act."
>
> Section 195 (15); Definitions: "The term 'Industrial Arts education programs' means those education programs (A) which pertain to the body of related subject matter, or related courses, organized for the development of understanding about all aspects of industry and technology, including learning experiences involving activities such as

experimentation, designing, and construction, evaluating and using tools, machines, materials and processes and (B) which assists individuals in the making of informed and meaningful occupational choices or which prepare them for entry into advanced trade and industrial technical education programs."

This definition was also listed under Title II of PL 94-482's regulations (in Section 104.592) for implementation of the Vocational Education Act as amended. Clearly the inclusion of this definition demonstrated congressional recognition that industrial arts programs and personnel can be equal partners with other vocational subject areas in the development, implementation, and evaluation of articulated comprehensive vocational education programs -- especially in the orientation and pre-specialization phases of such programs.

Industrial arts is a large and viable, i.e. technologically relevant, program currently available in most of today's public schools. Such programs involve the occupational preparation, growth, guidance and technological development of students for our modern industrial society. Industrial arts does this through an instructional program that addresses the technical, consumer, occupational, avocational, organizational, social, historical, and cultural aspects of industry and technology by study in the clusters of energy and power, materials and processing, and communication. While industrial arts fosters and builds upon general education with application-oriented learning experiences in technological cluster-based laboratories, thereby developing technological literacy, its scope and sequence of courses also contribute importantly and systematically to vocational/technical and career education by providing a place for students to explore occupational clusters with industrial relevance. The latter is of particular significance to females because industrial arts is the only subject in their formative years of schooling that has the potential of reaching a large proportion of this nation's female youth with learning based on industry and technology.

Industrial arts essentially encompasses two major thrusts: (1) vocational awareness, orientation and exploration activities that assist individuals in the making of informed and meaningful occupational choices; and (2) a program of hands-on, laboratory-based learning experiences that provide insight and skills about tools, machines, materials and processes, and through these they develop the technological literacy so vitally important today. It is the effective melding of both these thrusts that has caused industrial arts to be taken by over five and one-half million students a year.

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Scope and Sequence of Industrial Arts Education

Industrial arts curricula consist of experiences based upon nationally relevant economic/industrial clusters such as: materials and processing, communication, and energy and power (See Figure 1). These courses provide "hands-on" manipulative experiences that serve students' occupational and avocational needs in a manner that is consistent with the demands of our technological society's demands.

Contributions of Industrial Arts Education

Industrial arts programs provide students with unique opportunities to:

- develop insight and understanding about the place of industry in our society;
- appreciate the strength of free enterprise and the American economic system;
- discover and develop individual talents, aptitudes, interests, and potentials related to industry and technology;
- reinforce basic communication and computation skills that are important to every student's general education;
- develop an understanding of industrial processes and the practical application of scientific principles to industry;
- develop basic skills in the proper use of common industrial tools, materials, and processes;
- develop problem-solving skills and creative abilities involving industrial materials, processes, and products;
- develop an understanding of industrial and technological career opportunities and their requirements;
- develop those traits that will help obtain and maintain employment;
- prepare for entrance into advanced and highly skilled secondary and postsecondary vocational programs.

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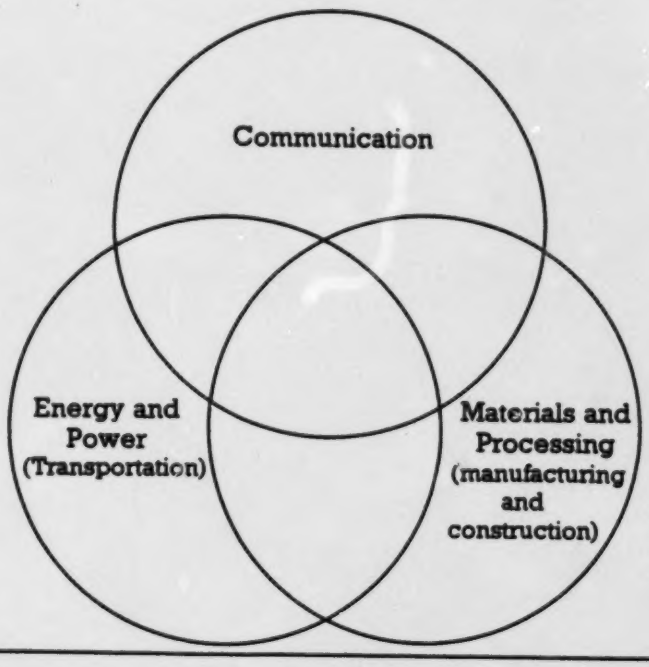
Figure 1 **The Scope of Industrial Arts Education**

Industrial Arts
is the
Interrelated Study of

Industry and Technology

- its organization and workers
- materials, products, and
- its tools, machines and processes
- its evolution
- wise uses, and
- its societal impacts

through laboratory activities in



Thereby developing

An organized and comprehensive base of industrial and technological skills, knowledges, and attitudes.

Industrial Arts students also further their capabilities in:

Understanding the relationships between technology and relevant aspects of the American free enterprise society.

Assessing their own career potentials

and

Exploring and pursuing career preparation through advanced Vocational/Technical education.

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Relationship of Industrial Arts to Vocational Education

In 1972, Congress recognized the importance of industrial arts and its objectives by adding industrial arts to the Amendments to the Vocational Education Act. Thus, benefits that went to vocational subjects were extended to industrial arts programs that fulfilled one or more of vocational education's objectives. The 1976 Amendments of the Vocational Education Act further specified industrial arts as a program eligible for the authorization and use of vocational funds under Title II, Part A, Subpart 2, Basic Grants. Therefore, industrial arts has a direct relationship to vocational, trades, industrial and technical education programs; and federal regulations released in the Federal Register of October 3, 1977, outline the function of industrial arts within the vocational education environment and provide guidelines for establishing a vocationally approved and fundable industrial arts program. Figure 2 illustrates some of the significant contributions that a well-nurtured and carefully planned industrial arts program provides to vocational education.

Unfortunately, because of past practice, the move to include industrial arts in state vocational program planning and funding has been less expeditious than desired. More recently, progress has been held back due to the constriction of federal vocational education funds and the increased competition this has engendered. However, in 1981 at least 30 states were using some federal vocational funds for industrial arts programs. This position is still somewhat tenuous, however, as evidenced by 1981's 9% decrease in the number of states using federal vocational dollars for industrial arts (Sarapin, 1982).

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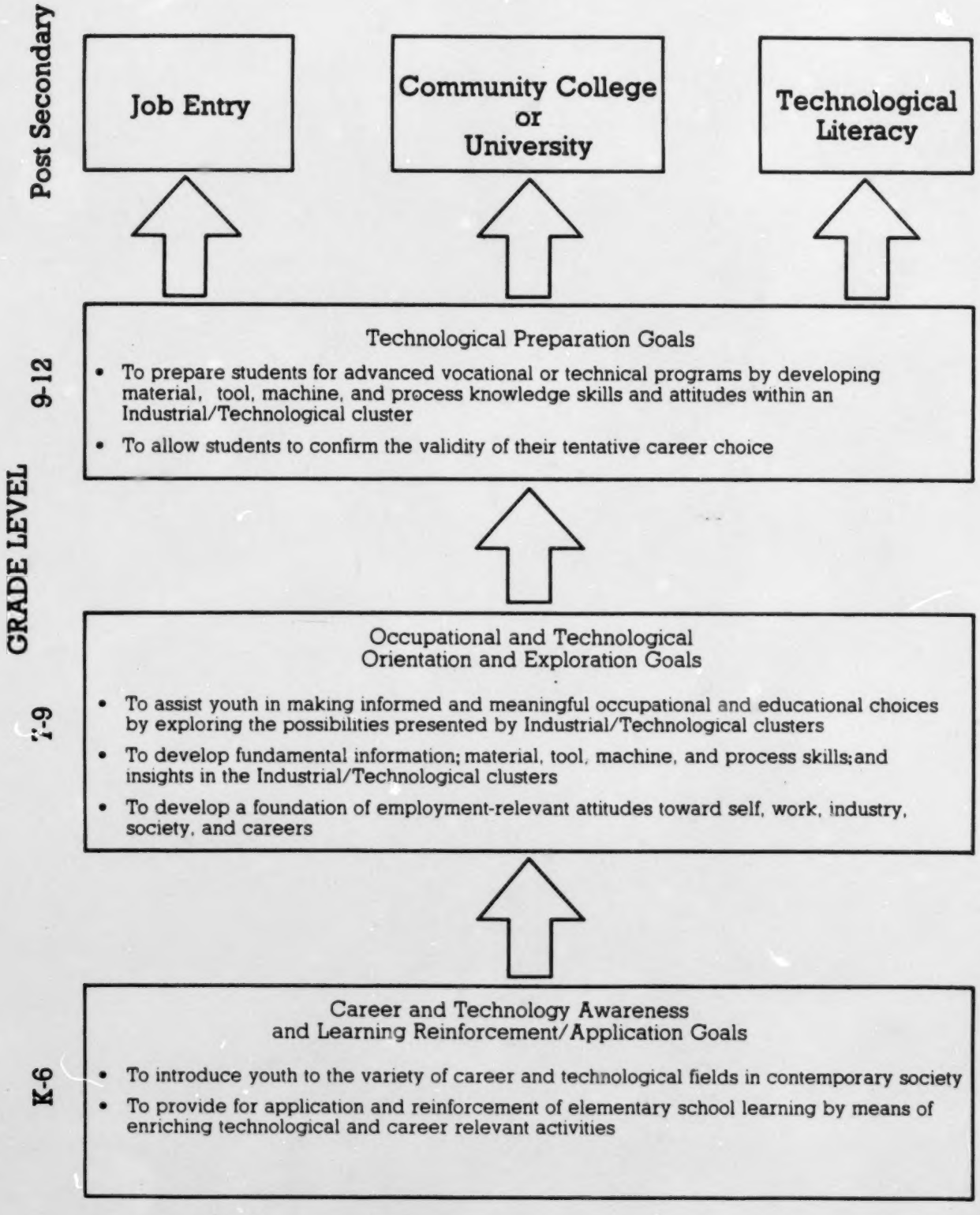
Figure 2

Vocational Contributions of the Industrial Arts Program Sequence


Post Secondary
Job Entry
Community College or University
Technological Literacy
GRADE LEVEL
9-12
Technological Preparation Goals
• To prepare students for advanced vocational or technical programs by developing material, tool, machine, and process knowledge skills and attitudes within an Industrial/Technological cluster
• To allow students to confirm the validity of their tentative career choice
7-9
Occupational and Technological Orientation and Exploration Goals
• To assist youth in making informed and meaningful occupational and educational choices by exploring the possibilities presented by Industrial/Technological clusters
• To develop fundamental information; material, tool, machine, and process skills; and insights in the Industrial/Technological clusters
• To develop a foundation of employment-relevant attitudes toward self, work, industry, society, and careers
K-6
Career and Technology Awareness and Learning Reinforcement/Application Goals
• To introduce youth to the variety of career and technological fields in contemporary society
• To provide for application and reinforcement of elementary school learning by means of enriching technological and career relevant activities

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CONSIDERATIONS AND OBSERVATIONS

School failures, unemployment, and the isolation of youth from positive engagement with the rest of our society have affected our nation's productivity. Industrial arts, as the basic general element of vocational education, provides most students with their first opportunity to develop the basic skills they need for the world of work. Laboratory experiences in industrial arts involve work with industrial tools, materials, and processes. Public school industrial arts programs motivate youth to stay in school longer and enter the labor market at a later age, better prepared for the world of work. For school drop-outs, industrial arts programs provide fundamental tool skills and knowledge, and thereby ease their eventual return to the study of academic or advanced vocational subjects.

The current U.S. economic situation demands greater work productivity and a revitalization of our industries. Industrial arts programs teach students about working in an industrial organization; understanding themselves and others; motivation for work; interpersonal relationships; on-the-job communications; using creativity on the job; authority and responsibility; problem-solving; coping with organizational conflict and change; leadership; and adapting and planning for the future. Our country's youth must learn to cope with life's economic realities and make meaningful contributions in a goods-producing/service-oriented society.

Industrial arts promotes vocational and technological exploration. It allows for the creation of self and societal understandings. In addition, industrial arts leads to the development of skills that cut across many different areas of human endeavor, including gainful employment! Such functional and application skills include learning to learn; coping with change; developing technological, economic, and cultural literacy; promoting wise consumer behavior; providing occupational orientation and exploration; practice with thought processes involving decision-making and problem-solving; dealing with authority and responsibility; and developing values that will serve as a basis for making meaningful contributions in an increasingly sophisticated technological society.

Vocational education has a major responsibility for producing individuals with an understanding and ability to function effectively in our technological society. Industrial arts programs have had a long tradition of supporting vocational education in meeting this crucial responsibility.

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Summary

Thus industrial arts is a program of instructional and laboratory experiences which provides basic general education for all students. Its content derives from industrial and technological aspects of life and its learning activities offer opportunities to gain insights into production, recreation, and consumerism through real and simulated experiences with tools, machines and materials.

These exposures, together with the infusion of occupational information, equip students to make wiser, more valid educational, career and lifestyle choices. Because the primary purpose of education in any society is to acquaint its members with the nature of its culture and their role in it, and because America's culture and economy is distinctly technological, industrial arts -- **because it is the sole curriculum that comprehensively addresses industrial technology** -- is a necessary element of education in America and an important contributor that helps vocational education achieve its goals more effectively and efficiently.

STRENGTHS WHEN VOCATIONAL EDUCATION AND INDUSTRIAL ARTS WORK TOGETHER

How can VE and IA work together?

- Vocational education can use IA's broad-based technological cluster programs for awareness, orientation, and exploration purposes. Systematic learning activities in this environment enable students to make more meaningful choices related to future occupations ad/or education.

- Vocational education can use IA to establish a basic core of technological skills and knowledge that is eminently transferable to a multitude of occupational preparatory programs.

- IA serves as one of the vocational education continuum's programs with perhaps the most potential for providing an alternative, hands-on mode for attaining many of the basic skills taught by other subjects. The effects of motivation and relevance are large and positive and technology-based IA programs deliver both in large measures.

- IA in its advanced laboratories can provide the initial phase of occupational preparation for many jobs requiring a technological base.

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- IA is the component of the vocational education continuum best equipped to inculcate technological literacy in the greatest number of our in-school youth.
- Through effective learning activities, IA can, just as the other vocational service areas do, reinforce learning from other subjects -- usually by providing a relevant application for such principles, concepts and skills.
- IA often serves as a very effective mechanism to alert and encourage students to pursue vocational education opportunities.

How does VE and IA work Together?

Overview: 28/30 states have reported the use of approximately 5 - 6 million dollars for industrial arts activities.

Examples of outstanding efforts include:

- Programs of National Significance (USDEd $)
  - National Industrial Arts Standards Project
- Personnel Development
  - Iowa Industrial Arts Cadre
  - NJ Leadership Development Project
  - Florida/Georgia Inservice Workshop and Conference Program
- Program Planning
  - NY IA Futuring Process
  - Competency lists (FL,AZ,VA,GA)
- Program/Curriculum Development
  - Iowa Master Plan and Cluster Handbooks
  - North Dakota Handbooks
  - Virginia Industrial Arts Materials
  - Curriculum Guides

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- Program Delivery
  - Virginia: Overall coordinated program, contemporary approaches for teaching technology
  - Utah: Integration of IA and T&I delivery
  - North Dakota: Technological cluster oriented program
  - Illinois: Industrial education master plan
  - Missouri: Occupationally Oriented Industrial Arts
  - Georgia: Extended day program (advisory committee, AIASA, better use of facilities and scarce teachers)
- Federal Leadership
  - Office of Adult and Vocational Education designation of an individual to provide leadership to the industrial arts profession.
- Vocational Student Organizations
  - AIASA exists in over 33 states and has better than 40,000 members.
  - Georgia, Texas, Connecticut, Virginia, Oklahoma, Arizona are all well known for their effective AIASA work
- BIL Interface
  - Greece Central School System, Rochester

One of the other, non-funded ways that industrial arts and vocational education work together is the exemplary manner in which the AIAA and the IA Division of the AVA work together -- Legislatively and Professionally.

Areas for increased cooperation in addressing mutual and national priorities

- Industrial arts is making a genuine breakthrough into real technology education. IA is moving towards broad clusters that interpret technology very effectively. With your support, this thrust could easily be enhanced to the point where it could very well demonstrate the educational system's capability to respond to the plethora of national reports calling for the incorporation of technology into the mainstream of education. Furthermore by joining with industrial arts in this thrust, you would reduce the separation from the educational system that vocational education is often chastised for.

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- Youth unemployment

  For most students industrial arts provides the first opportunity to develop basic skills drawn directly from the world of work. Laboratory experiences in industrial arts involve the use of industrial tools, machines, materials and processes.

  Making industrial arts available to in-school youth, *particularly those in high risk categories*, encourages them to stay in school longer and thereby delay entry into the labor market until a later age.

  For those who have already dropped-out, industrial arts programs provide fundamental tool skills and knowledge, and perhaps even more importantly, attitudes, that can be used for initial entry level employment as well as later to ease the return to the study of academic or advanced vocational subjects.

- Productivity

  The current economic condition demands greater worker productivity. Industrial arts programs develop desirable work attitudes; laboratory and shop management skills; tendencies for safe practice; efficient habits of time, tool, and material utilization and other work related employability skills.

- Energy

  Industrial arts draws its content from industry and then it interprets it by means of three technology-based clusters. One of these is Energy and Power.

  There students learn firsthand about energy sources, energy conversion processes and devices, power transmission methods, storage mechanisms, as well as the instrumentation and control necessary to accomplish all of this.

  Laboratory activities demonstrate energy conservation and allow students to gain relevant technical skills in this field's emerging technologies.

- Equity and special populations

  Industrial arts programs help disadvantaged and handicapped students recognize their potential and become contributing workers and citizens.

  IA teachers implement appropriate educational activities that allow learners with special needs to compensate for seemingly difficult disabilities. These

hands-on activities provide for the effective development of positive attitudes and useful competencies important to success in the world of work.

Although increasing numbers of female students are pursuing IA studies, the potential for involving more females remains high. Females represent a new supply of labor for many formerly stereotyped occupations. Through early and successful experiences in industrial arts, more females can be encouraged to consider advanced technical studies and non-traditional industrial occupations.

- Preparedness

American military personnel have always had a talent for overcoming emergencies by the creative application of basic mechanical skills. Industrial arts develops a residual core of fundamental mechanical skills and knowledge that is eminently transferable.

Energy and power study, troubleshooting and problem solving blueprint reading, communications technology, repair, and materials processing are capabilities that industrial arts students present the military. This provides the services with a pool of more qualified and versatile personnel.

- Technology/math/science

In the flurry of national reports recently unleashed the various authors have spoken to the need for increased attention to what they call Mathematics/Science/Technology. Unfortunately most of them recommend responses that only pertain to mathematics and science. They apparently do not realize that this is an inadequate response -- that infact industrial arts and vocational education provide the only significant exposure to technology available in the schools today. With your help, we can together build the case for vocational education's role in addressing our nation's crises in mathematics/science and technology -- real technology that is. Technology that involves being able to DO -- not just abstract "book larning!"

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CONCERNS

- It seems that because we are "the service areas most recently recognized by vocational education, that we are in the position of step-child -- namely funded only if dollars permit after all the others have been nourished.

- There appears to be significant confusion about the relative roles of VICA/AIASA in some quarters. This leads to TENSIONS that are counterproductive to our mutually shared objectives.

- We need to know of your personal position of support for industrial arts. People need to know of your perceptions of IA's role -- its capabilities -- its areas needing attention. Knowledge of this support is particularly important for your staff to hear. Your professionals in program support (planning, evaluation, research, curriculum) as well as those in the program specialty areas such as industrial arts, trade & industrial, and technical education need to be aware of your posture if we are to capitalize on our abilities to work together synergisticly.

- The tendency to overcompensate has us worried. Given the tremendous visibility of the various national commission reports and the accompanying knee-jerk reaction to them, we are worried that graduation requirements will be changed in a way that effectively eliminates the possibility of technological, practical arts, career development, and vocational components in the public school experience of our nation's youth.

- We are concerned by the significant tensions that exist between industrial arts and vocational education sectors in some states.

- Given today's scarce resources, we are seriously troubled by some observations that suggest vocational education is reinventing the wheel -- but this time under its auspices. More specifically, we would ask, Why establish courses for vocational exploration of technological and occupational clusters in areas where industrial arts exists and is already providing, or is capable of, providing such services? Why offer T & I programs in short time blocks so that they actually become very much like IA? Why participate in an expensive consortium for developing modules to teach the basic principles of technology when there exist numerous resources in your states to develop such modules much more cost effectively?

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- The teacher shortage gives IA the same concern that it does vocational education. We do not want uncertified, inappropriately certified, temporarily certified instructors in our laboratories. To assure the standards of excelience we are striving for, we need industrial arts teachers who have graduated from a NASDTEC and/or NCATE accredited industrial arts teacher education program.

WANTS/NEEDS

- Equity is not currently found in the resource allocation process nor do equal participation opportunities exist in the day to day planning and delivery of programs. Both are necessary for quality programming across the entire continuum claimed by vocational education. Rather than looking for ways to exclude IA, consider ways that we can work together.

- State industrial arts leadership is lacking despite the yeoman's efforts of some supervisors. Theirs is an almost impossible task. Our profession desperately needs numerous active state personnel in the role of industrial arts supervisor/director. Considering the number of IA teacher in the field, the paltry number of incumbent supervisors is laughable at best. Look at teacher-supervisor ratio. What does 1 to 1000 sound like to you? (50 supervisors to 50,000 teachers) What is the ratio for the other service areas?

- Careful scrutiny of the AIASA/VICA relationship in your state and the delineation of a significant role for each is important. We will have a better impact with two strong organizations.

- In testimony before congress we pointed out the imperative need for massive inservice programs. Programs that would help teachers move towards technology are necessary to the effective transition from an industrial crafts base to a technological one.

- Your ongoing support in our drive to spell out the role for industrial arts in vocational education legislation is sought.

- Your help is also wanted in interfacing the industrial arts' profession's needs with the practices in university level teacher education departments. There is great variability in the quality of teacher education departments and you can play a significant role in helping them move towards the technology-based industrial arts of the future. Encourage systematic response to the NASDTEC standards.

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- Don't fund the status quo. Fund change! For example, don't consider IA as only a 7th grade program. Cluster based courses in Energy & Power, Communications, and Materials Processing are very valuable in high school and post-secondary and/adult education. Consider only programs that address the National IA Standards for funding. Work towards local implementation of these standards.

- Encourage that vocational advisory councils include a person knowledgable of IA and prevocational programming and then encourage the councils to include IA in their scope of work and scrutiny.

- Support the development of programs and offerings in line with the NCES classification system.

- Collect IA data commensurate with that collected for all the other areas of vocational education.

- Be more demanding in your evaluations of programs and insist that they measure up to the established standards. Excellence can only be obtained through well conceived, rigorous programs in quality facilities.

SUMMARY

I have outlined a considerable agenda. One filled with both promises of deliverable potentials and recognition of the challenges that confront us. Certainly there was a risk in addressing you candidly -- after all the audience represented by your group is the single most influential group in vocational education in America!

My intent however was to broach the issues in the interests of engendering dialog, both here and back in your home states. I did not seek to curry favor.

One important point must be made before I conclude and open the period for discussion. It is imperative that there be no doubt in your minds that the industrial arts profession seeks to join with you in contributing to the development of the most effective continuum of vocational education that is humanly possible. To be sure, we will continue to address other missions also important to our profession, but we are and we will continue to be, an important component of America's vocational enterprise -- and we are proud to be of service in this way. Let us join together and succeed!

Thank you for your willingness to listen.

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APPENDIX A

PERTINENT DATA ABOUT INDUSTRIAL ARTS EDUCATION

Since its incorporation into the public school program almost 100 years ago, industrial arts has been considered part of general education, and as such it rarely received special funding. Yet, because of high student interest in this pertinent, relevant and motivating subject, industrial arts has grown to involve more than 56,000 teachers serving approximately 6,000,000 students annually -- at least 1,683,902 of whom are enrolled in programs receiving federal funding.

The enterprise of industrial arts is one that exists in every state of this nation. Recently and largely due to the Standards for Industrial Arts Programs Project, the profession has experienced a significant increase in both the quantity and quality of information available to describe it. Federal agency attention has also been directed towards industrial arts, but overall the nature of their efforts is still fragmented. Recent progress in achieving new National Center for Education Statistics (NCES) industrial arts course work classifications will prove valuable in the future.

But what of the industrial arts profession? This section will present some highlights that depict its characteristics largely in numerical terms. Unless otherwise noted, all data pertain to a period from 1979-81 and are derived from tables in The author's testimony before the House subcommittee as listed in the bibliography.

Student Enrollment

- Overall, conservative statistics indicate that between 5,460,000 and 6,060,000 students are enrolled in industrial arts, grades 7-12 (Table 1).
- Approximately 30% of the nation's total secondary enrollment experiences industrial arts (Table 1).
- Data reported by 20 states show 688,594 students (81.3% male, 18.7% female) are enrolled in industrial arts programs that received some federal vocational education funding (Table 2).
- Industrial arts enrollment, for programs with and without federal funds, is heaviest in grades 7-10 (Table 3).

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Program Purposes

- There is a high degree of national consensus on the purposes of industrial arts. Samples of principals, guidance coordinators and industrial arts chairpersons indicated the highest ranking goals to include (Table 4):

  1. Developing skill with tools and machinery
  2. Providing technical knowledge and skill
  3. Discovering and developing creative talent
  4. Developing leisure-time pursuits
  5. Developing problem-solving skills
  6. Making informed occupational choices
  7. Providing prevocational experiences

- A national sampling of over 1300 industrial arts chairpersons, guidance coordinators and principals found high recognition of industrial arts' contribution to both vocational and general education (Table 5).

- Over 90% of guidance coordinators reported that industrial arts has moderate or very high potential for breaking down stereotyping for females (Table 6).

Institutions

- There are approximately 20,436 secondary (6-12) schools with industrial arts programs in the USA (approximately 23% of all US public schools including elementary schools [Table 7]).

- In a national survey, with 35 states reporting, 74% of secondary schools offer industrial arts (Table 8).

- There are between 2050 and 3740 secondary schools that have industrial arts programs, receiving some federal vocational funds directly for industrial arts (Table 7).

Industrial Arts Facilities

- General woods (61 5%), drafting (56.1%), metals(55.7%), and general industrial arts (49%) laboratories represented the most frequently reported general industrial arts facilities in a random sample of the nation's schools (Table 9).

- Similarly, drafting (23%), metals (22.1%), woods (13.6%), and graphic arts (10.2%) constitute the most frequently available unit (i.e., more specialized) laboratories (Table 10).

- Technology cluster-based laboratories such as construction, materials and processing, manufacturing, energy and power, exploratory technology, and American Industry, constitute only a small proportion of the currently available industrial arts facilities (Tables 9,10).

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Teachers and Supervisors of Industrial Arts

- A minimum of 55,235 fully certified teachers were teaching industrial arts in 44 states during 1977-78 (Table 12). Because of partial responses and other variables, 1979-80 figures are lower, however, interpolation from previous-year data and reasonable estimates suggest there are about 55,000-60,000 industrial arts teachers nationwide (Table 12).

- With 37 states reporting, 1035 industrial arts teachers with temporary, emergency or non-certification were in the classroom (Tables 11, 12).

- The majority (94.2-95.1%) of industrial arts teachers held bachelor's (46.8-52.5%) and master's (42-48.3%) degrees (Table 13).

- Only a small proportion (1.5-4.7%) of industrial arts teachers in a national sample held contracts extended beyond the normal 9- to 10.5- month school year (Table 14).

- The average number of state-level industrial arts supervisors for those states reporting data was 1.66 persons in 1980-81. Since a total of 70 industrial arts supervisors were reported, approximation suggests that each one is responsible to supervise some 630 to 780 industrial arts teachers (Table 15).

- Four out of the 41 states responding to a national survey indicated that there was no state supervisor for industrial arts. Five states indicated that their supervisor was assigned less than full time to industrial arts (Table 15).

Industrial Arts Courses

- There is a tremendous diversity in industrial arts courses offered throughout the U.S.A. In 1972-73, 29 different subject classifications were used to report industrial arts enrollments (Table 16, 18).

- Through the entire grade range, course titles reported as representative of industrial arts reflected traditional programming (Table 17).

- Cluster-based courses were named less frequently than traditional programming, as being representative of industrial arts (Table 17).

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Student Organization

- The American Industrial Arts Student Association, the profession's federally approved vocational student organization, has grown to involve 21,665 students in 878 chapters in 34 states, 1981 (Table 19). This group's potential has caused it to more than double since 1974-75.

- During 1980, 2503 industrial arts teachers/advisors were served by AIASA workshops in 17 states (Table 20).

- AIASA is the smallest of all vocational student organizations (1980-81) but it is estimated to have the largest potential for growth (Table 21).

Industrial Arts Student Characteristics

- The majority (54-60%) of guidance coordinators and industrial arts chairpersons in a national sample rated the academic abilities of industrial arts students as being "about the same" as the general school population. At the same time, however, a smaller but still significant percentage (24-39%) of respondents rated industrial arts students as tending to be lower (Table 22).

- Industrial arts enrollment in comprehensive and vocational high schools has a racial/ethnic distribution of: 76.9% white, 13.3% black, and 7.6% hispanic (Table 23).

- Industrial arts enrollment in comprehensive and vocational high schools is 10.5% female and 89.5% male. Note that this is about half the 21.7% females reported enrolled in all of industrial arts. Clearly there are many females for whom industrial arts at the junior high school level represents a higher probability of exposure to technology and the world of work than high school industrial arts and vocational education (Table 23).

- In a 1980-81 national sample, with 21 states responding, 40,118 handicapped and 186,199 disadvantaged students were reported served by industrial arts (Table 25).

- Of the reporting schools in a nationwide sample, 49-55% indicated they served an average of 20-21 disadvantaged students with industrial arts (Table 24).

- Random and exemplary sample schools reported serving a broad cross-section of special needs students with no classification being excluded (Table 24).

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Industrial Arts Funding

- Industrial arts received $2,400,000 (federal) and $87,900,000 (non-federal) of the $4,451,200,000 non-federal and $385,500,000 federal funds expended on vocational programs (VEA Subpart 2: Basic Grant) in 1979. This amounts to 2.4% and 2.0% of the federal and non-federal totals respectively (Table 26).

- During FY81, industrial arts was included in 36 state plans for vocational education, a reduction of 14% over FY80's 42. Thirty states actually expended federal vocational education funds on industrial arts and this represented a decrease of 9% over FY80's 33 (Table 27).

- In FY80 eleven of the states responding in a national survey indicated the use of non-vocational federal funds (such as ESEA Title IV B & C) for industrial arts (Sarapin, 1982).

- A comprehensive but incompletely-responded-to survey indicated the following approximations for amounts of federal funds spent on industrial arts by purpose (Table 27).

1.	Staff development/inservice	$ 508,867
2.	Teacher education	379,150
3.	Supervision	357,620
4.	Teacher salaries	526,477
5.	Equipment grants & projects	3,914,124
6.	Curriculum projects	394,793
7.	Exemplary programs	165,200
8.	AIASA staff support	107,147
9.	Research, travel, other	62,850
	Total reported federal vocational investment in industrial arts 1980-81	6,416,228

- As reported by industrial arts department chairpersons, and with all income sources combined, only relatively small amounts are being spent annually for industrial arts equipment and supplies: equipment $1806-$4200 per department, supplies $2500-$6650 per department (table 28).

Evaluation of Industrial Arts

- In one state where exceptionally careful follow-up is made of all high school students, those that did take at least one course in industrial arts were found to have a higher incidence of subsequent vocational education and apprenticeship than students with similar math, English or social science enrollment (Table 29).

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- Similarly, industrial arts students were found to report lower percentages of unemployment than their colleagues with general education participation, and industrial arts students were within the range exhibited by vocational students on this same measure. With respect to the rate of paid employment, industrial arts students had higher percentages than general education students and as before, they were also within the range established by occupationally specific vocational students (Table 29).

- One year after leaving high school, students taking at least one industrial arts course reported earning average wages of $4.51, the third highest of their colleagues, with agriculture-$4.67, trade and industry-$4.59, English/social science-$4.26, mathematics-$4.25, office education-$4.17, and business education-$3.92 course experience.

- A national survey of industrial arts department chairpersons identified course content (47.2%) and staffing (36.1%) as their program's greatest strengths (Table 30).

- The preceding study also identified funding (43.2%) and facilities (29.8%) as their program's greatest weaknesses (Table 30).

Industrial Arts Teacher Supply and Demand

- There exists an industrial arts teacher shortage of major proportions: 1391 teacher vacancies were expected in 1979-80 (Table 31). Actual reported teacher vacancies have built to 1100, with 38 states reporting in 1980-81, from 1976-77's 812 vacancies in 40 reporting states (Table 33).

- A national survey found that approximately 5023 classes of industrial arts were not held due to a shortage of teachers. Even estimating a conservative average of 15 students per class, this would have caused 75,345 students to be denied the opportunities presented by industrial arts (Table 31).

- Consistently since 1976, industrial arts has been either the first- or second- ranked subject area highest in demand as indicated by national surveys of teacher placement officers (Table 32).

- The industrial arts teacher education profession engages approximately 1383 faculty in 139 institutions nationwide and in 1980-81 has produced 2906 bachelor-level graduates in industrial arts. Additional institutions, faculty, and graduates exist with industrial education/technology or other designations, but it is difficult to ascertain the extent to which they provide industrial arts teachers (Table 34).

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- The 1980-81 industrial arts bachelor's degree class is 5.3% smaller than the 1979-80 industrial arts class (Table 35).

- The 1979-80 graduating class of industrial arts teachers with bachelor's degrees and teaching certification was 93% male and 7% female for the 33 states reporting gender-identifiable data (Table 35).

- During 1979, 400 industrial arts teachers were laid off, presumably due to the monetary constraints faced by their school systems. This amounted to 1.7% of the total layoffs even though industrial arts teachers represented only 1.5% of the total number of employed teachers (Table 36).

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APPENDIX B

ADDRESSES OF ASSOCIATIONS CONCERNED WITH INDUSTRIAL ARTS

American Vocational Association
2020 North 14th Street
Arlington, VA. 22201
(703) 522-6121

Industrial Arts Division
c/o American Vocational Association

Michael J. Dyrenfurth, Ph.D.
Vice-President
103 Industrial Education
Department of Practical Arts and
Vocational-Technical Education
University of Missouri-Columbia
Columbia, MO. 65211
(314) 882-3082/2782

American Industrial Arts Association
1914 Association Drive
Reston, VA. 22091
(703) 860-2100

The following groups may be reached through the AIAA
American Council of Industrial Arts Teacher Educators
American Council of Industrial Arts State Association Officers
American Council of Elementary School Industrial Arts
American Council of Industrial Arts Supervisors

National Association of Industrial Technical Teacher Educators
c/o Dr. John G. Nee
Department of Industrial Education and Technology
Central Michigan University
Mt. Pleasant, MI. 48859

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